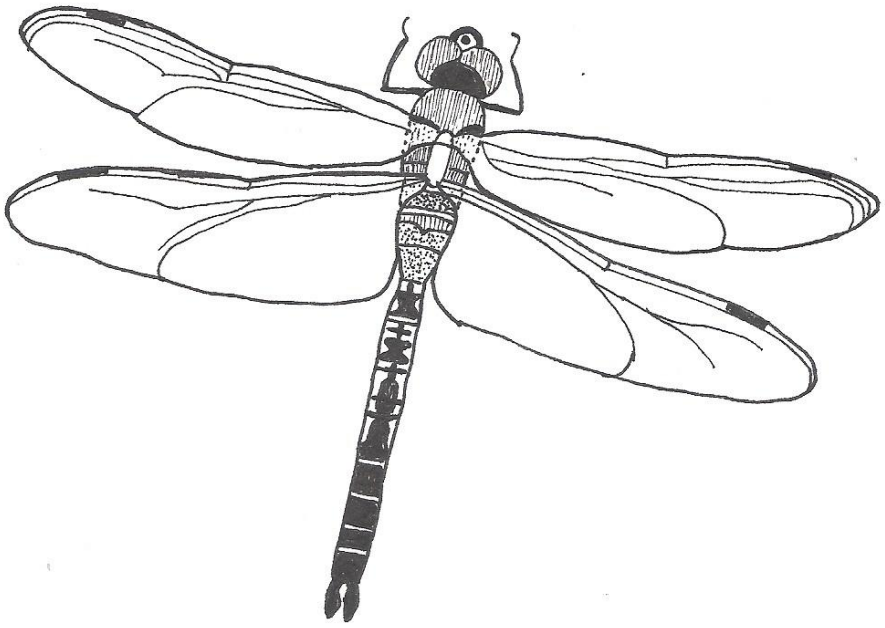
Damsels and Dragons

Odonates of Southeastern North Carolina



An Environmental Education Lesson Plan

Developed by Halyburton Park
and the Cape Fear Audubon Society

2008

Environmental Education Lesson Plan developed by

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Made possible by a grant from the Landfall Foundation

This lesson plan is available online at **www.capefearaudubon.org**

Please do not mark on this document.

Halyburton Park acknowledges the following organizations and individuals whose efforts made this environmental education activity possible:

City of Wilmington
Parks, Recreation and Downtown Services

New Hanover County
Airlie Gardens

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Cape Fear Audubon Society

The Landfall Foundation

Photographers
Jeff Pippen
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Illustrations
Cary Paynter

Table of Contents

Introduction to Halyburton Park

Located on South 17th Street in Wilmington, NC, Halyburton Park is a 58-acre tract of land owned by the City of Wilmington. It features gently rolling sand hills, longleaf pine flatwoods and lime-sink depression ponds. A cypress pond holds water year round.

An extensive environmental review showed the site to be of regional significance due to the number of natural features contained within the tract. Because the abundance of diverse, undisturbed plant collections in an urban area is so uncommon, the City, with support from both the public and environmental groups, chose to maintain the site as a natural area with limited development.

With this in mind, the City designed a park that emphasizes the property's natural areas, yet also provides light recreational facilities.

Halyburton Park as an Outdoor Classroom

The mission of the park's Environmental Education Program is to educate the residents of and visitors to New Hanover County about the natural world around them and encourage them to take an active role in its preservation**.**

The diversity of habitats found in the park is a living classroom for students to explore. The small lime-sink depression ponds and vernal pools are breeding sites for a variety of dragonflies and damselflies. The surrounding longleaf pine forest is also foraging habitat for these winged wonders. Both habitats are perfect places to observe the life cycles and behavior of these incredible insects.

Groups are encouraged to schedule a field trip, making use of our Environmental Education Lesson Plan. See page 23 for scheduling a trip.

Field trips will include a guided tour of two of our outdoor teaching areas with hands-on science education experiences. The program is correlated to the fourth grade science curriculum in the Standard Course of Study for North Carolina and focuses on life cycles, adaptations, and survival traits of a diversity of native wildlife.

The park's staff has over 15 years of experience in developing and leading interpretive and educational programs. They are also Certified Environmental Educators with the North Carolina Department of Environment and Natural Resources Office of Environmental Education.

Scheduling a Trip

At least two weeks' notice is required. To make a reservation, call Halyburton Park at (910) 341-0075.

Photocopy and complete the Scheduling Worksheet found on page 23 and return it to Halyburton Park as soon as possible.

Before the Trip

Complete the pre-visit activities provided.

Discuss behavior expectations with students and chaperones. Halyburton Park is not responsible for disciplining students who misbehave.

Divide each classroom into two groups prior to arrival. Each group must have an adult chaperone. We recommend a 1:10 ratio between chaperone and students.

Make sure the students dress appropriately for the weather. **Comfortable closed-toe shoes are required.** The group leader must obtain a parental permission slip for each student, including medical concerns. The leader may photocopy and use the sample form on page 24.

If you are going to be late or need to cancel, notify Halyburton Park as soon as possible at (910) 341-0075.

While at Halyburton Park

1. When on hikes, students should walk behind the guide at all times. Running is not permitted.

2. All of the plants and animals are protected and may not be touched or removed unless the guide gives permission.

3. Please use the trash and recycling receptacles. Do not litter.

4. In an emergency, contact park staff immediately.

After the trip

Post-visit activities are designed to complement your field trip experience and are created for classroom use.

Encourage students to seek answers to any questions they may have after visiting the park.

If appropriate, give evaluations or tests to find out if the students gained the desired information.

Please photocopy and complete the written evaluation form on page 25 and send it to the park office. This is an important step that allows us to make sure your experience is the best it can be.

Halyburton Park Contact Information

Halyburton Park
4099 S. 17th St
Wilmington, NC 28412

Phone: (910) 341-0075
Fax: (910) 794-6003

www.halyburtonpark.com

Office Hours

9:00 am – 5:00 pm
Monday – Saturday

Park Open Daily Dawn to Dusk

Activity Summary

"Damsels and Dragons" was created to provide hands-on environmental education activities for an on-site visit to Halyburton Park, as well as in the classroom.

The kit provided includes pre-visit, on-site, and post-visit activities. All of the activities are designed specifically for the fourth grade to meet the established curriculum objectives of the North Carolina Department of Public Instruction's Standard Course of Study.

A Halyburton staff member or education volunteer will conduct the on-site activities at Halyburton Park. The pre- and post-visit activities are designed for use in the classroom.

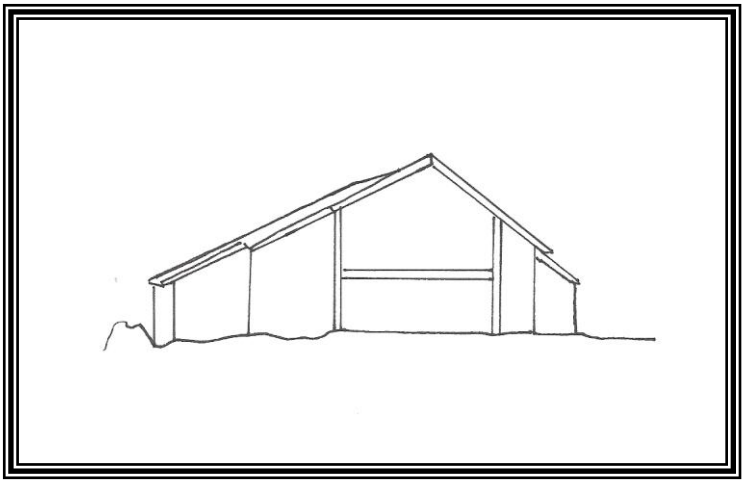
We encourage the use of the pre-visit activities before the field trip so the students are prepared with the necessary background information.

We have developed the post-visit activities to reinforce the concepts and skills learned during the field trip.

The major concepts students will encounter are:

- Incomplete metamorphosis
- Dragonflies and damselflies are Odonates
- Adaptations of Odonates to specific habitats
- Life cycle of Odonates

A list of vocabulary words is defined in the glossary. Also included is a list of references used in the creation of this lesson plan and which may be helpful in the classroom.



Halyburton Park Visitors Center

Pre-Visit Activity 1 Life-Cycle Flipbook

Curriculum Links

Grade 4

Science
Competency Goal 1
The learner will make observations and conduct investigations to build an understanding of animal behavior and adaptation.

1.01 Observe and describe how all living and nonliving things affect the life of a particular animal including:
- Other animals
- Plants
- Weather
- Climate

1.02 Observe and record how animals of the same kind differ in some of their characteristics and discuss possible advantages and disadvantages of this variation.

1.03 Observe and discuss how behaviors and body structures help animals survive in a particular habitat.

Location
Classroom

Group Size
30 students
(entire class)

Estimated Time
Approx. 1 hour

Materials Needed
- Student information sheet
- *Dragonflies* by Shane McEvey
- Crayons, markers or colored pencils, scissors
- Computer projector/ELMO Presenter
- Handout template (in kit)
- Copies of this template on cardstock or plain computer paper
- *Your Local Five: A Dragonfly Guide*

Major Concepts
- Dragonflies and damselflies have 3 stages in their life cycle (i.e., incomplete metamorphosis).
- Each stage has different habitat needs (food, water, shelter, space).
- Different species meet survival needs in different ways.

Objectives
- Become familiar with dragonflies and their life cycle.
- Understand the importance of dragonflies and their effect on the environment.
- Learn to identify four local dragonflies and one damselfly. Understand their major characteristics and differences.
- Learn to distinguish between dragonflies and damselflies.

Educator's Information

In this activity, students will learn the life cycle of dragonflies and damselflies and their basic needs. They will learn to identify four locally common dragonflies and one damselfly - how they are alike and how they differ.

Instructions

- Have students read the Student Information Sheet.
- Have students read individually or read aloud *Dragonflies* by Shane McEvey.
- Divide the class in 5 groups and assign each group one of the species of dragonflies and damselflies featured in *Your Local Five: A Dragonfly Guide.*
- Give each student 4 black- and-white flipbook pages (pages 11-12).
- Each page of the flipbook comes with a blank picture area where the student draws the different life stages of the dragonfly or damselfly. The student can use colored pencils, crayons, or markers. Students can determine the appropriate coloration by using books, posters, or *Your Local Five: A Dragonfly Guide.*
- Each page of the flipbook also comes with questions and space to provide written answers. Students will find the answers to these questions in the resources found in this kit, but students are also welcome to look for the answers using online resources, library books, or other appropriate reference material.
- Have the students cut out each page of the flipbook along the dashed lines.
- Assemble each page of the dragonfly or damselfly life cycle in the appropriate order, resulting in a simple flipbook of the dragonfly and damselfly life cycle.
- Using cardstock paper will make it easier to manipulate. Students can make a cover page, with the common and scientific name of their butterfly species.

Extension Activity

Have each group read about their species and report back any notable traits of each of those species, focusing on unique adaptations and behaviors.

Student Information

A dragonfly looks like a flying, mechanical monster, with shiny surfaces, huge eyes in a head that swivels and spiked legs that snatch prey from the air. Despite being masters of the air, they spend most of their life underwater.

Their **life cycle** begins with a tiny egg left by a female dragonfly in or near fresh water. She may drop her eggs into a pond or stream or inject them into mud, wood or the stem of a water plant.

The eggs hatch into **nymphs.** Nymphs are ferocious underwater **predators** that don't look at all like the adult dragonfly. Many **adaptations** help them survive underwater. Their long lower lips, with hooks on the end, shoot out to capture prey as large as small fish. Like fish, they have **gills** instead of lungs. They breathe by pumping water in and out of the gills in their **abdomen**, the tail end of an insect. To escape from predators, they force water backward out of their abdomen and shoot forward through the water like a jet ski.

Like all insects, dragonfly nymphs have no bones. Instead, a hard, shiny outer layer called the **exoskeleton** protects them. As they grow, the hard outer skin becomes too small. It splits open, or **molts,** and the nymph wriggles out. It is now larger and has new skin with room to grow. Each growth stage is called an **instar**. The nymphs of some dragonfly species may molt up to 15 times before becoming adults.

Next comes the most dangerous time in a dragonfly's life. After the last molt, it climbs out of the water and breaks open the exoskeleton. This usually happens at night because the new adult dragonfly is completely defenseless – weak, with crumpled wings and a body still folded up. It must slowly unfold its wings and abdomen and give them time to harden before it can fly to safety.

The new adult flies to a nearby woods or meadow to feed for a few weeks. Then it returns to a pond or stream to mate and lay eggs. This **life cycle**, from egg to nymph and from nymph to adult, is called **incomplete metamorphosis.**

Dragonflies and damselflies look alike. Both have hard, shiny bodies with a long, needle-shaped tail end and four fragile-looking wings. They both belong to the scientific group, the **Odonates.**

Watch dragonflies and damselflies fly and you see them fly straight up and down, backward, forward, hover in midair, and turn on a dime. They can do this because their front two wings move in a different direction from the back two.

Dragonflies fly faster than any other insect, making them dangerous predators. When they land, they hold their wings straight out. Look and you can see that the front set of wings is a different shape from the back ones.

Damselflies are weaker fliers. They flutter but dragonflies dart! Both sets of damselfly wings are the same shape. When they land, they often fold their wings back over their body, making it easy to tell them apart from dragonflies.

Don't bother trying to sneak up on an Odonate from behind. Each of their huge **compound eyes** is made up of many tiny eyes. They can see in all directions without turning their heads, even when flying! Dragonfly eyes are so big that they are close together or touching at the top. But damselfly eyes are far apart.

Both dragonflies and damselflies have the same life cycle. They begin as eggs laid in or near water. The eggs become nymphs living entirely in water. The nymphs grow until they are ready to leave the water as adults. Look closely at a nymph and notice that dragonfly nymphs have short, pointed "tails" at the end of their abdomens while damselflies have long, leaf-like "tails" which are the gills they breathe through.

If you are a mosquito, watch out for Odonates. Both dragonflies and damselflies are predators, snatching their victims in midair or off a plant. Their six bristly legs bend forward, forming a trap for snaring flying insects. Dragonflies can eat bigger insects than damselflies. They even eat damselflies - and each other! But you have nothing to fear - Odonates can't sting.

When watching dragonflies, you will see some odd behavior. First, they fight a lot. Each male has a **territory**, a part of the shoreline or stream where they feed and mate. When patrolling their territory, they chase away a male intruder by flying under him and shoving him out of the way. They may even eat another male.

If a female flies by, the male tries to capture her in midair by holding her head with the tip of his tail. When dragonflies are attached end–to-end this way, they are **flying in tandem**. The female then curls her back end up to touch the male for mating. Now the two are attached to each other in a circle. This is the **wheel position**. After mating, the male may guard the female while she lays her eggs, either remaining attached to her or flying close above her. In most species, it's easy to tell a male from a female because they are different colors. A dragonfly dipping its tail end into the water is a female laying eggs.

On a cool or cloudy day, dragonflies perched on plants are **basking,** holding their wings straight out to warm them. **Wing-whirring** is when they vibrate their wings to warm the wing muscles. They cannot fly until their wing muscles are at least 60-65 degrees F.

On a hot day, dragonflies may hold their tail ends straight up in the air. This keeps the sun from hitting most of their body and cools them off. It's called **obelisking** and looks as if they are doing a handstand!

Different species of dragonflies are adapted to different **habitats**. Some prefer the moving water of streams and rivers. Others live near the still water of ponds and lakes. In this way, competition between species is less.

Flipbook Template (1 of 2)

Space for Binding

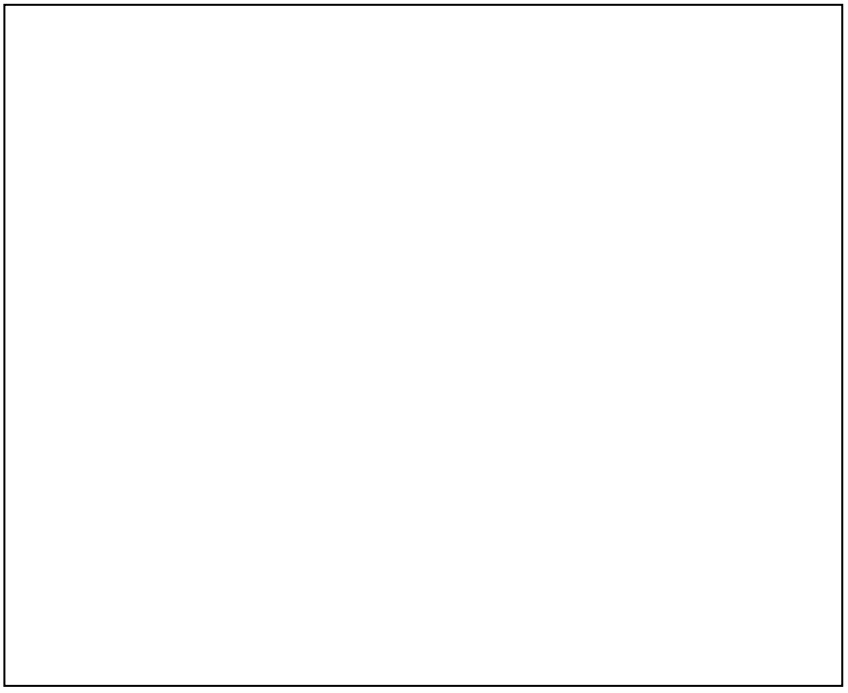
Egg

1. How are eggs deposited? (circle answer)

dropped into water
inserted into stems, logs or mud

2. In what kind of habitat does the female lay her eggs? (circle answer)

still water (pond or lake)
running water (stream or river)



Space for Binding

Nymph/Larva

1. What shape is the abdomen? (circle answer)

wide long and narrow

2. Are there gills (leaf-like structures) visible at the end of the abdomen? (circle answer)

Yes No

Flipbook Template (2 of 2)

Space for Binding

Adult

Adult Colors
Male:

Female:

Pattern on body:

Pattern on wings:

Space for Binding

Interesting Facts

On-Site Activities Halyburton

Curriculum Links

Grade 4

Science
Competency Goal 1
The learner will make observations and conduct investigations to build an understanding of animal behavior and adaptation.

1.01 Observe and describe how all living and nonliving things affect the life of a particular animal including:
- Other animals
- Plants
- Weather
- Climate

1.02 Observe and record how animals of the same kind differ in some of their characteristics and discuss possible advantages and disadvantages of this variation.

1.03 Observe and discuss how behaviors and body structures help animals survive in a particular habitat.

1.04 Explain and discuss how humans and other animals can adapt their behavior to live in changing habitats.

1.05 Recognize that humans by learning about other animals can understand themselves better

Competency Goal 4
The learner will conduct investigations and use appropriate technology to build an understanding of how food provides energy and materials for growth and repair of the body.

4.01 Explain why organisms require energy to live and grow.

4.03 Discuss how foods provide both energy and nutrients for living organisms.

Location
Halyburton Park

Group size
Maximum of 30 students, split into two groups.

Estimated time
45 minutes

Materials needed
(All materials provided by Halyburton Park.)

Major Concepts
- Closely related species can reduce competition through adaptations that divide habitat.
- Adaptations help organisms meet specific needs.
- Incomplete metamorphosis

Objectives
- Observe and identify 4 species of dragonflies.
- Identify distinguishing characteristics of dragonflies and damselflies.
- Observe and explain incomplete metamorphosis.
- Observe and identify habitat needs of Odonates.
- Describe adult and larval adaptations.

Educator's Information

The students will learn about dragonfly and damselfly behavior and adaptations by observing both adult and larval forms. They will discuss the needs of each life stage and assess a habitat's capacity to meet these needs.

A Halyburton staff person, intern, or education volunteer will lead the students through the teaching activities. Divide students into groups before arrival. **Prior to your visit, distribute copies of the Student Information Sheet (pp. 9-10) so your class is familiar with the subject.**

Instructions

A Halyburton guide will greet the students and give them a brief orientation of what they will be doing on their visit. Each class will be divided into groups, and each group will be assigned an instructor. The instructor will take them through the activities listed below.

Activity #1 Observation and Habitat Assessment

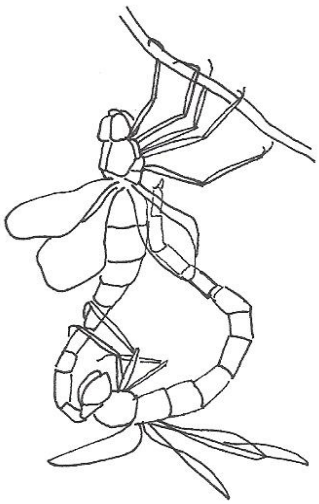
Students will hike to the large cypress pond and smaller vernal ponds to observe adult dragonfly and damselfly behavior. They will look for the following behaviors:

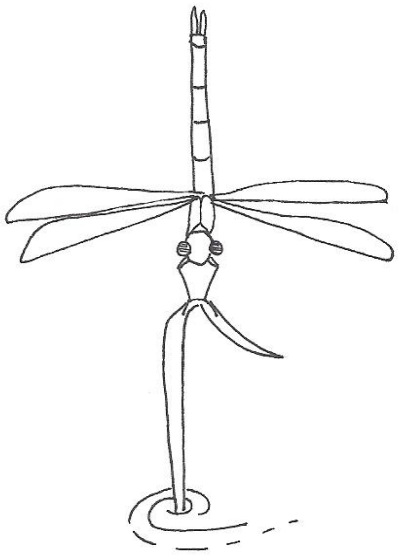
- Territorial disputes, flight displays
- Wheel position
- Egg laying
- Feeding

They will apply what they know about the needs of dragonflies and damselflies to assess the habitats they are viewing.

Activity #2 Sampling for Nymphs

The instructor will show the students how to sample for dragonfly and damselfly larvae by using dip nets. They will learn to sort and identify different species. They will observe nymph behavior: crawling, propulsion and feeding. They will observe larval adaptations such as gills, labium and wing pads and their role in the species' survival.





Post-Visit Activity 1 Build a Dragonfly

Curriculum Links

Grade 4

Science Competency Goal 1: The learner will make observations and conduct investigations to build an understanding of animal behavior and adaptation.

1.03 Observe and discuss how behaviors and body structures help animals survive in a particular habitat.

Location
Classroom

Group Size
30 students (entire class)

Estimated Time
30 minutes

Materials Needed
Art materials supplied by teacher.

Major Concepts

- The adaptation of an organism to its environment.
- Animals' names, both scientific and common, often describe their appearance, behavior or habitat.

Objectives

- Identify and describe the advantages of dragonfly/damselfly adaptations
- Understand the connection between the name of an organism and its appearance, behavior or habitat.

Educator's Information

Students will use their knowledge of dragonflies' needs and adaptations to create an imaginary dragonfly that can thrive in a given habitat. They will give their dragonfly a two-part name that reflects its appearance, behavior or habitat.

Instructions

Review the body parts of dragonflies and damselflies and their function.

Discuss with the students the various adaptations covered in the Student Information Sheet on pages 9 – 10.

Tell the students they will each design and name their own original dragonfly and decide on the following:

- Where it lives
- What it eats
- The placement of its eyes
- Colors and patterns on body and wings
- Where it reproduces

Students then draw and color their imaginary dragonfly.

Explain that insects have common and scientific names. In common names, the first name describes the species (Splendid) and the second tells what group it belongs to (Clubtail). What kinds

of information does a common name tell about a dragonfly?

Have students choose a name from each group or use their own adjectives to create a name for their dragonfly.

Have them write a description of their dragonfly, including the name, food sources, habitat, its adaptations and their advantages.

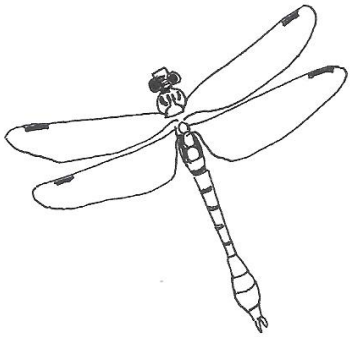
Have the students present their dragonfly to the class and explain its uniqueness.

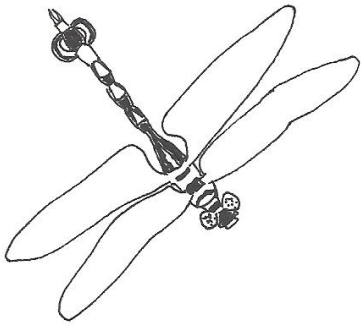
GROUP A
describes individual species

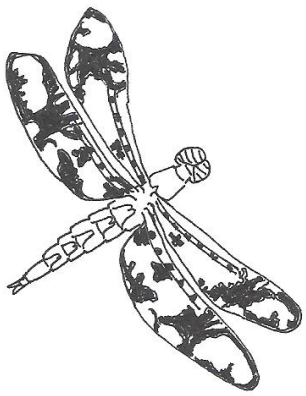
Splendid
Banded
Spotted
Blue-tailed
Clearwing
Emerald
Ruby
Giant
Red-eyed
Two-striped
Striped
Swamp
River
Pond
Bar-winged
Rainbow
Turquoise-tipped
Green-faced

GROUP B
describes group it belongs to

Clubtail
Pondhawk
Skimmer
Basketttail
Amberwing
Darter
Whitetail
Glider
Darner
Saddlebags
Rubyspot
Dancer
Bluet
Forktail
Snaketail







Post-Visit Activity 2 Compare and Contrast

Curriculum Links Grade 4

Science Competency Goal 1
The learner will make observations and conduct investigations to build an understanding of animal behavior and adaptation.

1.03 Observe and discuss how behaviors and body structures help animals survive in a particular habitat.

1.05 Recognize that humans can understand themselves better by learning about other animals.

Location
Classroom

Group Size
30 students (entire class)

Estimated Time
45 minutes

Materials
Comparison Chart (page 18)

Major Concept

Animal adaptations can be studied to produce significant technological advances.

Objectives

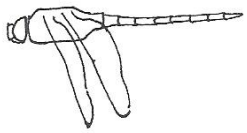
- Recognize the efficiency of dragonfly adaptations for flight.
- Explore the similarities and differences between dragonfly flight and that of aircraft.

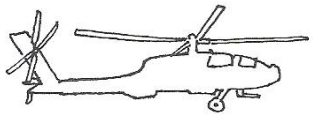
Educator's Information

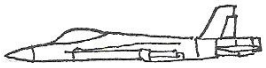
Students will use the knowledge gained in their readings and on-site activities to explore physical similarities and differences between dragonflies, airplanes and helicopters.

Instructions

- Review with the students how dragonflies, helicopters and airplanes compare to each other in flight capabilities.
- On the blackboard, create the table found on p. 18, but keep the Comparison Table blank.
- Through discussion and brainstorming as a class, fill in the comparison table, using the completed chart on p. 18 to guide the discussion.







Dragonfly, Airplane and Helicopter Comparison Table

	Dragonfly	Airplane F/A-18 Hornet	Helicopter A/H-64 Apache
Fuel/Power Source	Solar power: needs heat energy to fly	Fuel/electricity	Fuel/electricity
Speed	• 1.65 mph (2.66 km/hr) for large dragonflies • Can travel up to speeds of 35 mph in short bursts	Max speed: 1,190 mph (1,915 km/hr) at 40,000 ft	• Max speed: 316 mph (509 km/hr) • Cruise speed: 246 mph (396 km/hr)
Weight	Adult: 0.0026 lbs. (1- 1.2 grams)	Empty weight: 24,700 lbs. (11,203,731 grams)	Empty weight: 33,140 lbs. (15,032,051 grams)
Wing Shape and Placement	• Pair of long, narrow ovals, one on each side just before mid-body • Pair of long, narrow wings, wider at base, at mid-body • Wingspan: up to 6 inches (0.5 ft)	• 1 wing on each side located just past mid-body, shaped like a 4-sided polygon • 1 wing located on each side of tail end, shaped like a rounded triangle • Wingspan: 40 feet	• 1 wing on each side of mid-body, rectangular shape, with propellers on each wing • 1 wing on each side of tail, shaped like a 4-sided polygon • Wingspan: 46 ft (84 ft including propellers)
Maneuverability	• Can fly forward, backward, up, down, side-to-side • Can turn somersaults and hover • Moves in a fast, jerky manner • Sitting still, can move wings up and down	• Can fly forward, at steep angles up or down • Cannot hover, go backwards, or fly side-to-side • Movement is fast, but not jerky	• Can fly forward, backward, up, down, side-to-side • Can hover • Movement is slow and gradual, not fast and jerky, except when flying forward
Navigation	• Compound eyes • Has 30,000 different eye lenses • Can see in all directions.	Computers, GPS, radar, pilot	Computers, GPS, radar, radio, pilot

Post-Visit Activity 3 Dragonfly Haiku

Curriculum Links

Grade 4

Language Arts Competency Goal 2:
The learner will apply strategies and skills to comprehend text that is read, heard, and viewed.

2.03 Read a variety of texts, including:

- fiction (legends, novels, folklore, science fiction).
- nonfiction (autobiographies, informational books, diaries, journals).
- poetry (concrete, haiku).
- drama (skits, plays).

Competency Goal 4:
The learner will apply strategies and skills to create oral, written, and visual texts.

4.07 Compose fiction, nonfiction**,** poetry, and drama using self-selected and assigned topics and forms (e.g., personal and imaginative narratives, research reports, diaries, journals, logs, rules, instructions).

Location
Classroom

Group Size
30 students (entire class)

Estimated Time
30 minutes

Materials Needed
Pencil and paper
Haiku books if desired

Major Concept

The importance of close observation in both science and the arts.

Objectives

- Understand the cultural significance of dragonflies in Japanese culture.
- Understand the form of haiku poetry.
- Using their own observations of dragonflies' appearance and behavior, students will be able to create a haiku describing the behavior or appearance of dragonflies.

Educator's Information

An early name for Japan is the Island of the Dragonflies.

Dragonflies are symbols of courage and victory and are linked to the samurai warriors. In poetry, they are markers of the late summer/early fall, when hordes of red dragonflies come down from the mountains each year.

Haiku is a popular form of Japanese poetry. Called "one-breath poetry," it has just three lines with 5 syllables in the first and last lines and 7 in the second. The number of syllables can vary slightly.

Students should use their observation of dragonflies to create mental images of what they saw or heard, and translate those images into a few well-chosen words. This is "Show; Don't Tell" poetry. The students should not write about what they think or feel.

Instructions

Brainstorm with the students about the behavior and appearance of the dragonflies seen at Halyburton. Read and discuss several haiku. See examples below.

Have each student come up with a mental picture for their haiku. Students should write their haiku using the fewest words possible.

Sample Haiku

Crimson pepper pod
Add two wings and
look –
Darting dragonfly!

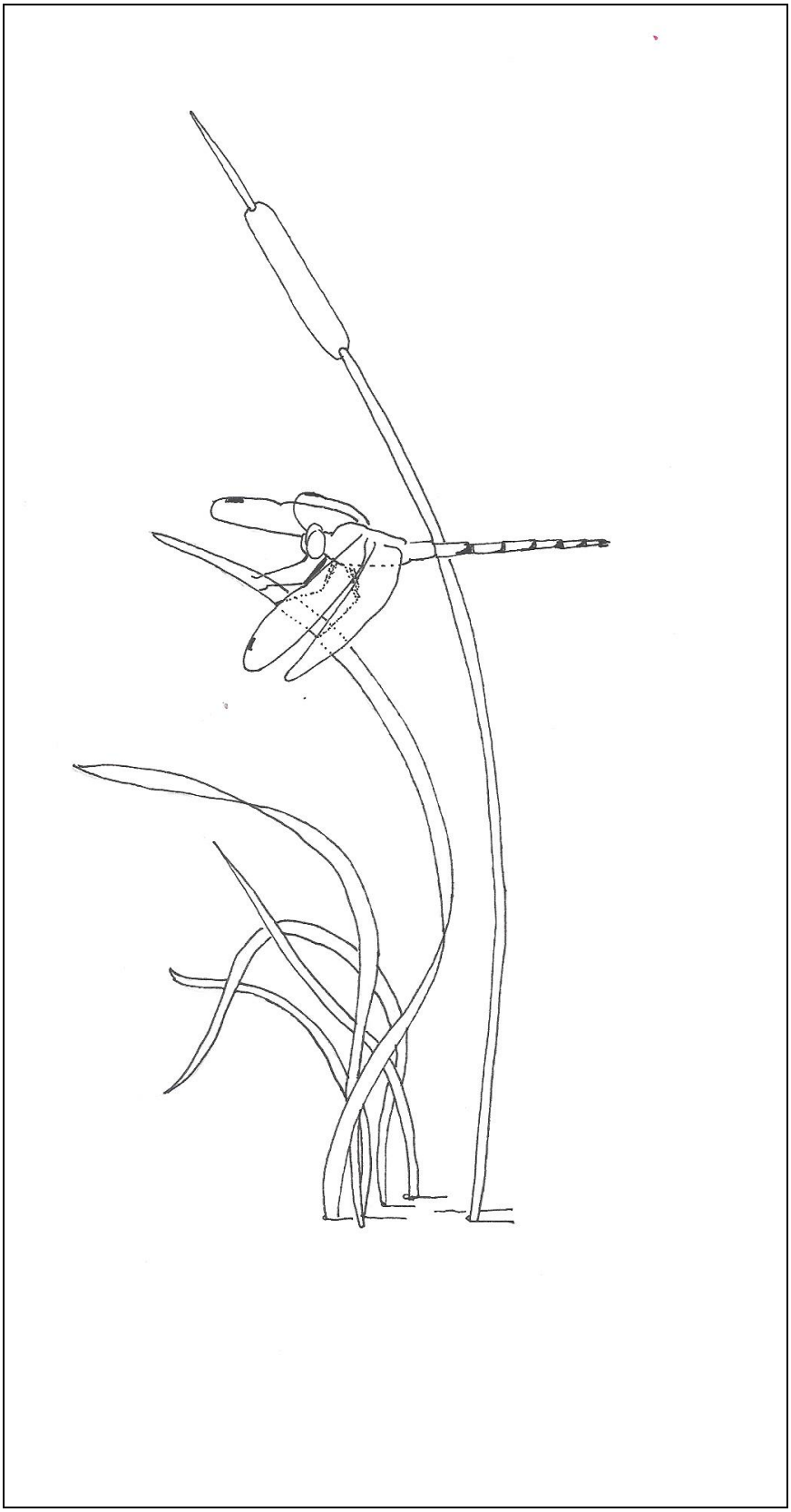
Basho

A dragonfly touches
down
Leaves a few circles
growing
In the water

Lorraine Harr

A dragonfly, trying to –
Oops, hang on to the
topside
Of a blade of grass

Basho



Glossary of Terms

Abdomen: Tail area of an insect, containing the heart, reproductive organs and most of the digestive system.
Adaptation: A change in structure or function that improves an organism's reproductive success.
Basking: Holding the body perpendicular to the sun to catch the heat; sunbathing.
Compound eye: An eye made up of many tiny simple eyes that allow an insect to see in almost every direction.
Exoskeleton: Hard outside covering of an insect.
Flying in tandem: Position by which the male attaches himself to the female before mating.
Gills: The organs used for underwater breathing; dragonfly nymphs breathe through gills.
Habitat: Area or environment where an organism normally lives.
Incomplete metamorphosis: The series of changes in the body of some insects from egg to nymph to adult; a three-stage life cycle.
Instar: A single stage of larval development; the stage between molts.
Labium: Lower lip.
Life cycle: The series of changes in a species from conception through growth, reproduction, death and the beginning of a new generation.
Molt: Shed the exoskeleton in order to grow.
Nymph: Aquatic stage of a dragonfly or damselfly.
Obelisking: Holding the abdomen straight up in the air, like a handstand, to shade the body from sun.
Odonates: Scientific name of the order that includes dragonflies and damselflies.
Predator: Animal that captures and eats other animals.
Spiracle: Opening in the exoskeleton through which air moves into a breathing tube.
Territory: Area used by an animal to breed, raise young and find food.
Wheel position: Roughly circular or heart shaped position formed by mating dragonflies or damselflies.
Wing pads: Wing-like structures lying flat on the back of a dragonfly nymph.
Wing-whirring: Vibrating or "shivering" the wings to produce enough heat for flight at cool temperatures.

Resources and References

Books

Beaton, Giff. *Dragonflies and Damselflies of Georgia and the Southeast.* Athens and London: University of Georgia Press. 2007.

Cassedy and Suetake. *Red Dragonfly on My Shoulder.* New York: HarperCollins. 1992.

Demi. *In the Eyes of the Cat: Japanese Poetry for All Seasons*. New York: Henry Holt and Company. 1992.

Dunkle, Sidney W. *Dragonflies through Binoculars. New York:* Oxford University Press, 2000.

McEvey, Shane. *Dragonflies*. Broomall, PA: Chelsea House Publishers. 2001.

Mitchell and Lasswell. *A Dazzle of Dragonflies*. College Station, TX: Texas A&M University Press. 2005.

Nikula, Sones, and Stokes, Donald and Lillian. *Stokes Beginner's Guide to Dragonflies*. London: Little, Brown and Company, 2002

Websites

http://www.dragonflies.org/catalog.htm

http://www.duke.edu/~jspippen/dragonflies.htm

http://www.giffbeaton.com/dragonflies.htm

http://www.rlephoto.com/odes/index.html

http://www.carolinanature.com/odonata/

http://www.odonatacentral.org/index.php/GalleryAction.bySpecies

http://www.twodragonflies.com

Please photocopy or download this sheet and fill out the copied worksheet, as other teachers will be using this resource.

Scheduling Worksheet

1) Name of group (school): ____

2) Contact Person: _______________ ____________________________________
   name   phone (work)   (home)

____
address

3) Day/date request: ____

4) Number of students: ________

5) Number of chaperones: ____
   (Note: We require one adult for every 10 students)

6) Areas of special emphasis:____

7) Special considerations of group (e.g. allergies, health concerns, physical limitations):

____

8) Please use the parental permission form provided on the following page. There is a photo release portion that must be returned to Halyburton Park.

Call Halyburton Park at (910) 341-0075 to schedule a fieldtrip, fax a completed form to (910) 794-6003 or email info@halyburtonpark.com if you have questions.

- -

I, _________________________, have read the entire "Damsels and Dragons" Lesson Plan and understand and agree to all the conditions within.

____

Return to: Halyburton Park
4099 S. 17th St
Wilmington, NC 28412

Parental Permission Form

Dear Parent:

Your child will soon be involved in an exciting, hands-on learning experience at Halyburton Park. They will participate in many different activities in two of our outdoor teaching areas. Please understand that insects, poison ivy and other potential risks are a part of any outdoor setting.

To make your child's experience as safe and enjoyable as possible, be sure they wear clothing appropriate for outdoor activity and likely weather. Comfortable, closed-toe shoes should be worn. We ask that you provide us with the following information:

Child's Name: _____

Does your child:

- have any allergy to bee stings or insect bites? _____
  If so, please have the child bring their medication and make sure that they, or a group leader, know how to administer it.

- have other allergies? _____

- have any other heath problems that we should be aware of? _____

  _____

In an emergency, I give permission for my child to be treated by the attending physician. I understand that I would be notified as soon as possible.

_____ _____

Parent's signature Date

Parent's name: _____ Home phone_____

(Please print) Work phone _____

Family Physician's name: _____ Phone: _____

Alternate Emergency Contact:_____

Name: _____ Phone: _____

I give permission for my child to be photographed by a Halyburton Park staff member or a professional photographer, and I allow those photographs to be used in Halyburton Park publications and on the park website.

_____ _____

Parent's Signature **Date**

Halyburton Park Program Evaluation

Please take a moment to evaluate the program you received. Halyburton Park is committed to providing quality programs that meet teachers' needs**. By filling out the provided form, you are helping us achieve this goal. Please mail completed forms to 4099 S. 17th St, Wilmington, NC 28412. Attn: Environmental Education Program.**

Date of Program: _____

Program leader(s): _____

Did the program meet your curriculum needs? Yes ☐ No ☐

If no, please explain:

_____

_____

How would you rate the on-site program? Excellent ☐ Good ☐ Fair ☐ Poor ☐

Comments:

_____

_____

Would you recommend this program to other teachers? Yes ☐ No ☐

Are you likely to return for a program in the future? Yes ☐ No ☐

How would you rate the pre-visit activities?

Excellent ☐ Good ☐ Fair ☐ Poor ☐

Comments:

_____

_____

How would you rate the post-visit activities?

Excellent ☐ Good ☐ Fair ☐ Poor ☐

Comments:

_____

_____

Notes